

Nutrient Cycling Enzymes and Microbial Community Shifts in an Organic Sod-based Vegetable Rotation

Rotating crops with a perennial grass, such as Bahiagrass, has proven benefits including increasing organic matter, improving soil fertility, and reducing water demand. In this study, plots were in either 0, 1, or 2 years of Bahiagrass before starting an organic vegetable production system.

Microbial community studies and nutrient cycling enzyme activities in the soil are instant biological indicators that give us insights into how management practices influence sustainability of a system.

Here we compare microbial community shifts and activities of C, N, and S cycling enzymes- **acid phosphatase (ACP)**, **alkaline phosphatase (ALP)**, **β -glucosidase (BG)**, **β -Glucosaminidase (BGLM)**, and **Arylsulfatase (AS)** under conventional and strip till practices and increasing years of bahiagrass before plots went into vegetable production.

Study Design & Methods

History: Previously in conventional crop rotation of cotton and peanuts

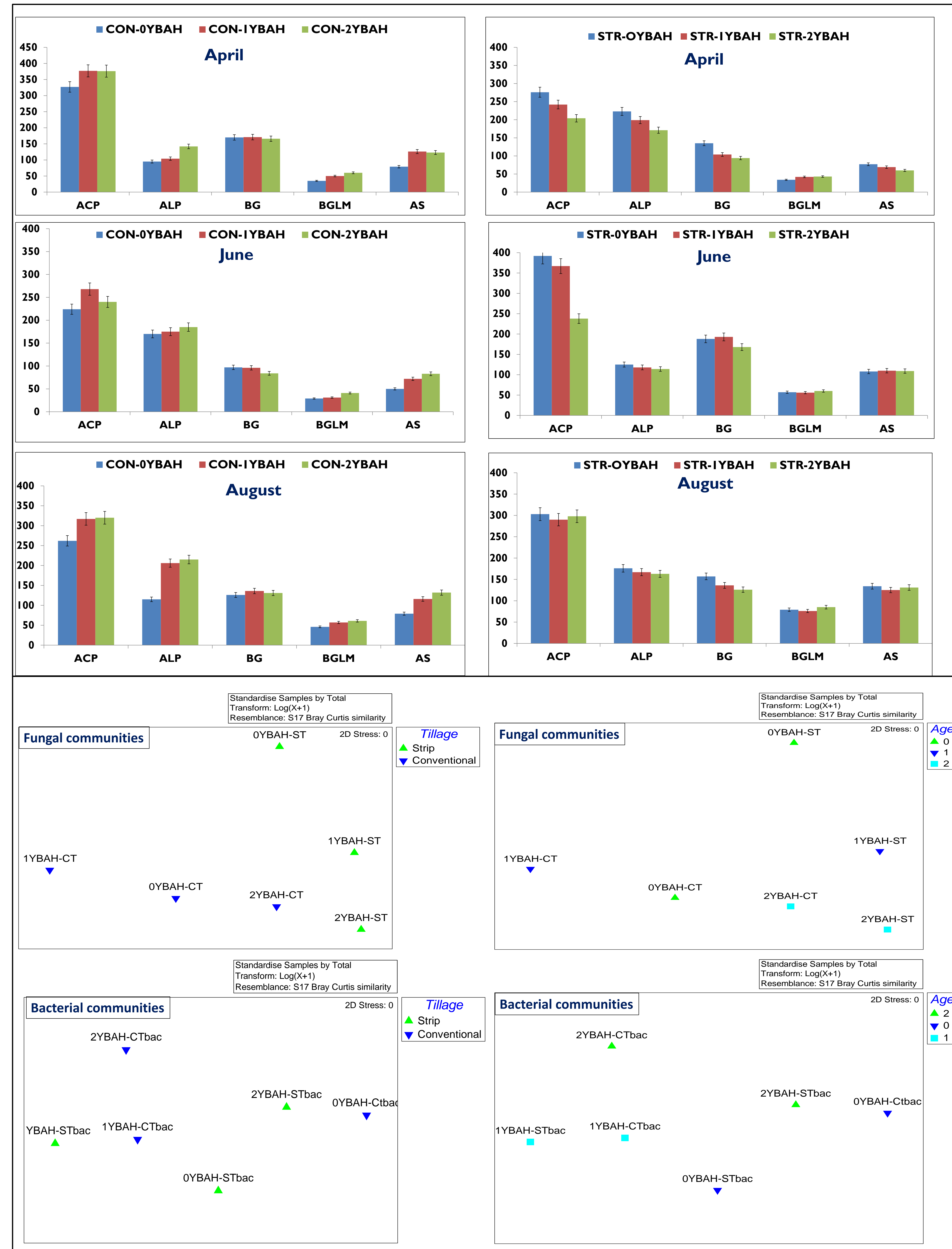
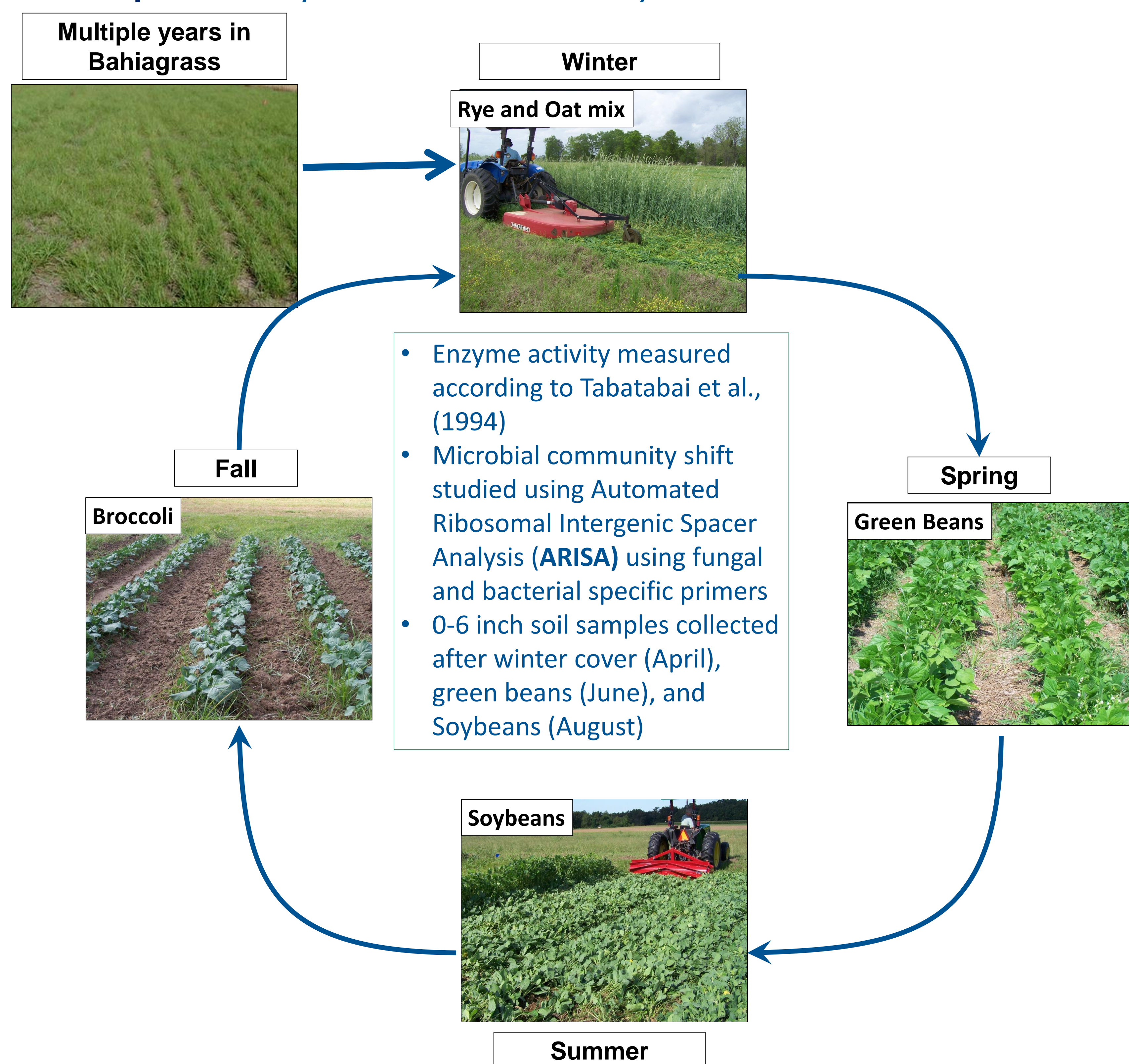
Rotation: Multiple years of bahiagrass followed by continuous spring and fall vegetable production with cover crops

Years in bahiagrass: 0 – 2

Conventional-till- crops mowed and tilled into soil; **Strip-till** - residue left on soil surface with conservation tillage

Cash crops: Spring: Bush beans (*Valentino*); Fall: Broccoli (*Major*)

Cover crops: Winter: Rye & Oat mix; Summer: Soybean



Summary

- Relative distribution of all the enzymes is similar irrespective of tillage or number of years in bahiagrass prior to vegetable production
- Strip-till seems to harbor greater overall enzyme activity but not significantly different than conventional till
- In conventional till, the trend is for enzyme activities to be greater with increasing number of years in bahiagrass prior to vegetable production; this trend is not clear in strip-till treatments indicating that tillage probably exacerbates soil degradation thereby making the presence of sod more significant than in strip or no-till situations
- Fungal community analysis showed some clustering based on tillage and none based on years of bahiagrass indicating that the crop at time of sampling influenced microbial communities more than other conditions
- Long term research on these plots will help establish definite trends in the biological indicators over time